

Kentucky Department of Labor Hazard Alert

Office of Occupational Safety and Health

Combustible Dust Explosion Hazards

2003 - Kentucky

Combustible dust resulting from a manufacturing process produced several explosions and fire that killed 7 and injured 37 employees. This *Hazard Alert* has been issued in conjunction with the Kentucky Department of Labor's comprehensive outreach effort to prevent further combustible dust fires and explosions in Kentucky workplaces.

Dust Explosion Consequences

Fire and explosion due to combustible dust pose immediate and deadly risks to the health and safety of Kentucky's workforce. Dust explosions are routinely catastrophic in nature, resulting in loss of lives, severe structural damage, and are often devastating to the community. If your company is potentially affected by these hazards, please take action now to prevent tragic consequences.

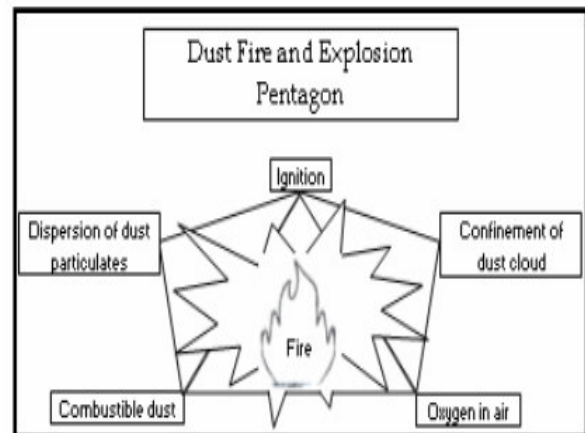


Damage from a combustible dust explosion in KY

Industries at Risk

Kentucky industries that handle powders or bulk solids in dust-producing processes are at risk of combustible dust explosions. These may include the following:

- Plastics production;
- Rubber reclamation;
- Wood, paper, or pulp processing;
- Flour and feed mills;
- Manufacture or storage of metal powders;
- Chemical production;
- Starch and candy production;
- Spice, sugar, and cocoa operations;
- Coal handling and processing;
- Pharmaceutical plants;
- Grain elevators, bins, and silos; and,
- Tobacco handling operations.



Understanding Combustible Dust Explosions

The 3 elements needed for a fire (the "fire triangle") are:

1. Combustible dust (fuel);
2. Ignition source (heat); and,
3. Oxygen in air (oxidizer).

Additional elements needed for a combustible dust explosion:

4. Dispersion of dust particles in sufficient quantity and concentration; and,
5. Confinement of the dust cloud.

Multiple Explosions

An initial (primary) explosion may shake loose more accumulated dust, or damage a containment system (such as a duct, vessel, or collector). As a result, the additional dust dispersed into the air may cause one or more secondary explosions. These can be far more destructive than a primary explosion due to the increase in quantity and concentration of dispersed combustible dust.

Recognizing and understanding combustible dust hazards is vital.

- Conduct general facility wide appraisals of dust explosion possibilities on a periodic basis.
- Conduct internal and external audits in order to identify potential explosion hazards.
- Encourage an anticipatory attitude among employees for dust explosions.
- Have employees and supervisors identify explosion hazards through job hazard analyses.
- Pay particular attention to dust collection systems and other areas not in plain view during the assessment.

How to Prevent and Control the Hazard

Employers must adopt a comprehensive approach to preventing and controlling combustible dust hazards which includes, but is not limited to, the following measures:

- Prevent the use of compressed air, dry sweeping, or other cleaning methods that can disperse combustible dust into the air when feasible.

- Conduct workforce training and education courses regarding recognition and control of combustible dust hazards.
- Limit and control potential ignition sources in dust accumulation areas.
- Ensure electrical service in combustible dust areas is appropriate for hazardous (Class II) locations, as required by the National Electrical Code.
- Follow National Fire Protection Association (NFPA) standard 654, *Standard for the Prevention of Fire and Dust Explosions from Manufacturing, Processing, and Handling of Combustible Particulate Solids*, and other NFPA dust explosion prevention standards for specific industries, as applicable.
- Ensure operations involving dusts have proper engineering design and controls.
- Maintain an effective housekeeping program to prevent or eliminate dust build-up on ledges, ductwork, building framing, or other surfaces. Even small accumulations of dusts (as little as 1/32 of an inch) can create a dust explosion hazard if spread over sufficient surface area.
- Establish and maintain a preventative maintenance program to preserve the integrity of process equipment and minimize the release of fugitive dust particles.

Explosion Damage Control

Examples of methods which have been developed to minimize the damage caused by dust explosions can be found in:

- NFPA 69, *Standard on Explosion Prevention Systems*.

Regulatory Agencies

Representatives from the Division of Occupational Safety and Health Compliance, or the State Fire Marshall's Office may visit your facility to assess the potential for combustible dust hazards.

Further Assistance

Cost free assistance regarding combustible dust hazards or other occupational safety and health (OSH) concerns is available upon request from:

Office of Occupational Safety and Health, Division of Education and Training
US HWY 127 South, Suite 4, Frankfort, KY 40601
(502) 564-3070 www.kylabor.net

Disclaimer

This Hazard Alert is provided as a source of guidance and provides only general information. It does not alter or determine individual responsibilities or replace in total or in part any provision set forth in applicable regulations.

